



DEPARTMENT OF ENERGY

10 CFR Part 430

EERE-2019-BT-TP-0012

RIN 1904-AD86

Energy Conservation Program: Test Procedure for External Power Supplies

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Supplemental notice of proposed rulemaking and request for comment.

SUMMARY: On December 6, 2019, the U.S. Department of Energy (“DOE”) published a notice of proposed rulemaking (“NOPR”) proposing certain amendments to its test procedure for external power supplies (“EPS” or “EPSs”). In this supplemental notice of proposed rulemaking (“SNOPR”), DOE is proposing additional amendments and modifications to certain proposals presented in the SNOPR. In this document, DOE is proposing to remove reference to direct operation and indirect operation Class A EPSs in the scope; simplify and more explicitly align the scope of the test procedure with the scope of the energy conservation standards; provide additional specifications for the testing of EPSs that do not ship with an output cord; and align the testing requirements for programmable power supplies with those for Universal Serial Bus Power Delivery (“USB-PD”) EPSs. Further, DOE proposes to maintain the location of certain definitions for which it proposed in the NOPR to relocate. DOE is seeking comment from interested parties on the proposals.

DATES: DOE will accept comments, data, and information regarding this SNOPR no later than **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**. See section [V], “Public Participation,” for details. DOE will hold a webinar on Wednesday, December 15, 2021 from 12:30 p.m. to 4:00 p.m. See section V, “Public Participation,” for webinar registration information, participant instructions, and information about the capabilities available to webinar participants. If no participants register for the webinar, it will be cancelled.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov*. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE-2019-BT-TP-2012, by any of the following methods:

(1) *Federal eRulemaking Portal: www.regulations.gov*. Follow the instructions for submitting comments.

(2) *E-mail: to EPS2019TP0012@ee.doe.gov*. Include the docket number EERE-2019-BT-TP-2012 in the subject line of the message.

No telefacsimilies (faxes) will be accepted. For detailed instructions on submitting comments and additional information on this process, see section V of this document.

Although DOE has routinely accepted public comment submissions through a variety of mechanisms, including postal mail and hand delivery/courier, the Department has found it necessary to make temporary modifications to the comment submission process in light of the ongoing COVID-19 pandemic. DOE is currently suspending receipt of public comments via postal mail and hand delivery/courier, and instead, the

Department is only accepting electronic submissions at this time. If a commenter finds that this change poses an undue hardship, please contact Appliance Standards Program staff at (202) 586-1445 to discuss the need for alternative arrangements. Once the COVID-19 pandemic health emergency is resolved, DOE anticipates resuming all of its regular options for public comment submission, including postal mail and hand delivery/courier.

Docket: The docket, which includes *Federal Register* notices, public meeting attendee lists and transcripts (if a public meeting is held), comments, and other supporting documents/materials, is available for review at www.regulations.gov. All documents in the docket are listed in the www.regulations.gov index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket web page can be found at www.regulations.gov/docket?D=EERE-2019-BT-TP-0012. The docket web page contains instructions on how to access all documents, including public comments, in the docket. See section [V] for information on how to submit comments through www.regulations.gov.

FOR FURTHER INFORMATION CONTACT:

Mr. Jeremy Domm, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-9870. E-mail ApplianceStandardsQuestions@ee.doe.gov.

Ms. Kristin Koernig, U.S. Department of Energy, Office of the General Counsel,
GC-33, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone:
(202) 586-3593. E-mail: *kristin.koernig@hq.doe.gov*.

For further information on how to submit a comment, review other public
comments and the docket, or participate in a public meeting (if one is held), contact the
Appliance and Equipment Standards Program staff at (202) 287-1445 or by e-mail:
ApplianceStandardsQuestions@ee.doe.gov.

SUPPLEMENTARY INFORMATION:

This SNOPR proposes to maintain a previous incorporation by reference in 10
CFR part 430 in the following industry standard:

International Electrotechnical Commission (“IEC”) standard 62301 (“IEC
62301”), *Household electrical appliances—Measurement of standby
power*, (Edition 2.0, 2011-01).

Copies of IEC 62301 (Second Edition) can be obtained from the American
National Standards Institute, 25 W. 43rd Street, 4th Floor, New York, NY 10036, (212)
642-4900, or go to *<https://webstore.ansi.org>*.

For a further discussion of this standard, see section IV.M.

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I. Authority and Background

An EPS is a “covered product” for which DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6295(u)(1)(A))

DOE’s energy conservation standards and test procedures for EPSs are currently prescribed at 10 CFR 430.32(w) and 430.23(bb), respectively. The following sections

discuss DOE's authority to establish test procedures for EPSs and relevant background information regarding DOE's consideration of test procedures for this product.

A. Authority

The Energy Policy and Conservation Act, as amended ("EPCA"),¹ authorizes DOE to regulate the energy efficiency of certain consumer products and types of industrial equipment. (42 U.S.C. 6291-6317) Title III, Part B² of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth provisions designed to improve energy efficiency for a variety of products and equipment. These products include EPSs, the subject of this document. (42 U.S.C. 6291(36)(A); 42 U.S.C. 6295(u))

EPCA's energy conservation program consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291), energy conservation standards (42 U.S.C. 6295), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making representations about the efficiency of those consumer

¹ All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Pub. L. 116-260 (Dec. 27, 2020).

² For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

products (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the products comply with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6297(d))

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. EPCA requires that any test procedures prescribed or amended under this section be reasonably designed to produce test results which measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

In addition, EPCA requires that DOE amend its test procedures for all covered products to integrate measures of standby mode and off-mode energy consumption. (42 U.S.C. 6295(gg)(2)(A)) Standby mode and off-mode energy consumption must be incorporated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product unless the current test procedures already account for and incorporate standby mode and off-mode energy consumption or such integration is technically infeasible. (42 U.S.C. 6295(gg)(2)(A)(i)) If an integrated test procedure is technically infeasible, DOE must prescribe separate standby mode and off-mode energy use test procedures for the covered product, if technically feasible. (42 U.S.C.

6295(gg)(2)(A)(ii)) Any such amendment must consider the most current versions of International Electrotechnical Commission (“IEC”) Standard 62301³ and IEC Standard 62087⁴ as applicable. (42 U.S.C. 6295(gg)(2)(A))

The Energy Policy Act of 2005 (“EPACT 2005”), Pub. L. 109-58 (August 8, 2005), amended EPCA by adding provisions related to EPSs. Among these provisions were a definition of EPS and a requirement that DOE prescribe “definitions and test procedures for the power use of battery chargers and external power supplies.” (42 U.S.C. 6295(u)(1)(A))

The Energy Independence and Security Act of 2007 (“EISA 2007”), Pub. L. 110-140 (December 19, 2007) later amended EPCA by modifying the EPS-related definitions prescribed at 42 U.S.C. 6291. While section 135(a)(3) of EPACT 2005 defined an EPS as “an external power supply circuit that is used to convert household electric current into DC current or lower-voltage alternating current (“AC”) to operate a consumer product,” section 301 of EISA 2007 further amended this definition by creating a subset of EPSs called Class A EPSs. EISA 2007 defined this subset of products as those EPSs that, in addition to meeting several other requirements common to all EPSs, are “able to convert [line voltage AC] to only 1 AC or DC output voltage at a time” and have “nameplate output power that is less than or equal to 250 watts.” (42 U.S.C. 6291(36)(C)(i)) As part of these amendments, EISA 2007 prescribed minimum standards for these products (hereafter referred to as “Level IV” standards based on the marking provisions detailed under 10 CFR 430.32(w)(4)) and directed DOE to publish a final rule to determine

³ IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011-01).

⁴ IEC 62087, *Methods of measurement for the power consumption of audio, video, and related equipment* (Edition 3.0, 2011-04).

whether to amend these standards.⁵ (42 U.S.C. 6295(u)(3)(A) and (D)) EISA 2007 also required DOE to publish a second rule to determine whether the standards then in effect should be amended. (42 U.S.C. 6295(u)(3)(D)(ii))

EISA 2007 also amended EPCA by defining the terms “active mode,” “standby mode,” and “off-mode.” Each of these modes corresponds to the operational status of a given product – *e.g.*, whether it is (1) plugged into AC mains and switched “on” and performing its intended function, (2) plugged in but not performing its intended function (*i.e.*, simply standing by to be operated), or (3) plugged in, but switched “off,” if a manual on-off switch is present. Additionally, EISA 2007 required DOE to amend its test procedure to ensure that standby and off-mode energy consumption are measured. It also authorized DOE to amend, by rule, the definitions for active, standby, and off-mode, considering the most current versions of IEC Standards 62301 and 62087. (42 U.S.C. 6295(gg)(2)(A) (incorporating EISA 2007 amendments related to standby and off-mode energy)).

Following the amendments to EPCA under EISA 2007, Congress further amended EPCA to exclude EPSs used for certain security and life safety alarms and surveillance systems manufactured prior to July 1, 2017, from no-load standards. Pub. L. 111-360 (January 4, 2011). EPCA’s EPS provisions were again amended by the Power and Security Systems (“PASS”) Act, which extended the rulemaking deadline and effective date established under the EISA 2007 amendments from July 1, 2015 and July 1, 2017, to July 1, 2021 and July 1, 2023, respectively. Pub. L. 115-78 (November 2, 2017); 131 Stat. 1256, 1256; 42 U.S.C. 6295(u)(3)(D)(ii)). The PASS Act also extended

⁵ The international efficiency markings on which DOE’s marking requirements are based consist of a series of Roman numerals (I-VI) and provide a global uniform system for power supply manufacturers to use that indicates compliance with a specified minimum energy performance standard.
www.regulations.gov/document?D=EERE-2008-BT-STD-0005-0218

the exclusion of certain security and life safety alarms and surveillance systems from no-load standards until the effective date of the final rule issued under 42 U.S.C.

6295(u)(3)(D)(ii) and allowed the Secretary to treat some or all external power supplies designed to be connected to a security or life safety alarm or surveillance system as a separate product class or to further extend the exclusion. (42 U.S.C. 6295(u)(3)(E)(ii) and (iv))

Most recently, on January 12, 2018, the EPS Improvement Act of 2017, Pub. L. 115-115, amended EPCA to exclude the following devices from the EPS definition: power supply circuits, drivers, or devices that are designed exclusively to be connected to and power (1) light-emitting diodes providing illumination, (2) organic light-emitting diodes providing illumination, or (3) ceiling fans using direct current motors.⁶ (42 U.S.C. 6291(36)(A)(ii))

EPCA also requires that, at least once every 7 years, DOE evaluate test procedures for each type of covered product, including EPSs, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(1)(A))

If the Secretary determines, on her own behalf or in response to a petition by any interested person, that a test procedure should be prescribed or amended, the Secretary shall promptly publish in the *Federal Register* proposed test procedures and afford

⁶ DOE amended its regulations to reflect the changes introduced by the PASS Act and EPS Improvement Act. 84 FR 437 (January 29, 2018).

interested persons an opportunity to present oral and written data, views, and arguments with respect to such procedures. The comment period on a proposed rule to amend a test procedure shall be at least 60 days and may not exceed 270 days. In prescribing or amending a test procedure, the Secretary shall take into account such information as the Secretary determines relevant to such procedure, including technological developments relating to energy use or energy efficiency of the type (or class) of covered products involved. (42 U.S.C. 6293(b)(2)). If DOE determines that test procedure revisions are not appropriate, DOE must publish its determination not to amend the test procedures.

B. Background

DOE's current EPS test procedures appear at 10 CFR part 430, subpart B, appendix Z, "Uniform Test Method for Measuring the Energy Consumption of External Power Supplies" ("Appendix Z").

DOE published a NOPR to amend the test procedure on December 6, 2019. 80 FR 67106 ("December 2019 NOPR"). In the December 2019 NOPR, DOE proposed to add a definition for "commercial and industrial power supply" in its regulations to differentiate between EPSs, which are covered products, and non-consumer power supplies, which are not covered products. DOE also proposed to create a definition to address an adaptive EPS that conforms to the USB-PD specifications and revise its procedure to address their testing in a manner more representative of their actual use. Further, the proposed revisions would provide more specific instructions for testing single-voltage EPSs that have multiple output busses. Lastly, DOE proposed to reorganize the test procedure to centralize definitions, consolidate generally applicable

requirements, and better delineate requirements for single-voltage, multiple-voltage, and adaptive EPSs. DOE sought comment from interested parties on the proposal. DOE held a public meeting related to this NOPR on December 11, 2019 (“December 2019 NOPR public meeting”).

DOE received comments in response to the December 2019 NOPR from the interested parties listed in Table I.1.

Table I-1 Written Comments to the December 2019 NOPR

Commenter(s)	Reference in this SNOPR	Commenter Type
Pacific Gas and Electric, Southern California Edison, San Diego Gas and Electric	CA IOUs	Utility Association
Canadian Standards Association	CSA	Efficiency Organization
Consumer Technology Association	CTA	Trade Association
Information Technology Industry Council	ITI	Trade Association
National Electrical Manufacturers Association, American Lighting Association	NEMA/ALA	Trade Association
USB Implementers Forum	USB-IF	Trade Association

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.⁷ This SNOPR addresses only those comments relevant to the proposals laid out in this document; all other relevant comments will be addressed in the final rule. The regulatory text as amended by the amendments proposed in both the December 2019 NOPR and this SNOPR is presented at the end of this document for the convenience of review of all the proposed amendments.

⁷ The parenthetical reference provides a reference for information located in the docket of DOE’s rulemaking for the EPS test procedure. (Docket No. EERE-2019-BT-TP-0012, which is maintained at www.regulations.gov). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

II. Synopsis of the Supplemental Notice of Proposed Rulemaking

In this SNOPR, DOE proposes to supplement (or replace) those proposed amendments from the December 2019 NOPR with further amendments that would provide as follows:

(1) Remove reference in the scope section of appendix Z to direct operation and indirect operation Class A EPSs because there is no distinction in how these EPSs are tested.

(2) More explicitly align the test procedure with the scope of the energy conservation standards set forth at 10 CFR 430.32(w)(1) by excluding from testing devices for which the primary load of the converted voltage within the device is not delivered to a separate end use product.

(3) Specify testing requirements for EPSs that are packaged without an output cord to provide explicitly that these EPSs are tested with an output cord that is recommended for use by the manufacturer.

(4) Modify the proposal from the December 2019 NOPR to define “USB-PD” EPS so as to include programmable power supplies (“PPSs”) and USB-PD EPSs with optional voltages and currents; and further amend the definition of “nameplate output power” to specify that USB-PD EPSs must be tested at the lowest nameplate output voltage, which can be as low as 3.3 volts for PPSs, rather than at 5 volts (as was proposed in the December 2019 NOPR).

Additionally, DOE is modifying the December 2019 NOPR’s proposal to relocate certain definitions. Specifically, DOE is no longer proposing to relocate the definitions of “Class A external power supply”, “basic-voltage external power supply”, “direct

operation external power supply”, “indirect operation external power supply”, and “low-voltage external power supply” at 10 CFR 430.2 rather than include them in appendix Z.

The actions proposed in this SNOPR are summarized in Table II.1 and addressed in detail in section III of this document. Unless otherwise provided, DOE continues to propose the amendments presented in the December 2019 NOPR. To facilitate commenter review, the proposed regulatory text at the end of this document provides the proposed regulatory text from the December 2019 NOPR as modified by the proposals in this SNOPR.

Table II-I Summary of Changes in Proposed Test Procedure Relative to Current Test Procedure and to Amendments Proposed in the December 2019 NOPR

Current DOE Test Procedure	December 2019 NOPR Proposals	Proposed Test Procedure	Attribution
Specifies that the scope of the test procedure includes direct operation EPSs and indirect operation Class A EPSs.	Not addressed.	Deletes the specific reference to direct operation EPS and indirect operation Class A EPS.	Response to stakeholder comment to more explicitly define the scope of the test procedure.
Does not explicitly exclude testing of devices for which the primary load of the converted voltage within the device is not delivered to a separate end use product.	Specified that components and circuits unrelated to EPS functionality may be disconnected during testing as long as the disconnection does not impact the functionality of the EPS itself.	Excludes devices for which the primary load of the converted voltage within the device is not delivered to a separate end use product.	Response to stakeholder comment to more explicitly define the scope of the test procedure.
Does not include definitions of “adaptive external power supply”, “basic-voltage external power supply”, “direct operation external power supply”, “indirect operation external power supply”, and “low-voltage external power supply”. These definitions are specified in 10 CFR 430.2.	Proposed to move all of these definitions to the EPS test procedure at appendix Z.	Proposes to retain all of these definitions at 10 CFR 430.2 except “adaptive external power supply”.	Improve readability and applicability of the test procedure.
Does not include definition of Class A EPSs, which is currently specified in 10 CFR 430.2.	Proposed inclusion of Class A EPS definition in appendix Z while also retaining it in 10 CFR 430.2.	Proposes retaining Class A EPS definition in 10 CFR 430.2 only and not include it in appendix Z.	Improve readability and applicability of the test procedure.

Does not explicitly provide instructions for testing EPSs that are not supplied with output cords.. 10 CFR part 430, subpart B, appendix Z (generally).	Proposed to require EPSs that are not supplied with an output cord to test at the output electrical contact that can be connected to a physical wire.	Requires EPSs that are not supplied with an output cord to test with an output cord recommended for use by the manufacturer.	Improve representativeness of test procedure.
Requires adaptive EPSs that meet the IEC 62680-1-2 specification to test at 3 amps for the 100% loading condition at the lowest operating output voltage of 5 volts.	Proposed to define an adaptive EPS that meets the voltage/current specifications of IEC 62680-1-2 as a “USB-PD EPS” and require that it be tested at 2 amps for the 100% loading condition at the lowest operating output voltage of 5 volts.	Defines an adaptive EPS that meets the voltage/current specifications of IEC 62680-1-2 as a “USB-PD EPS” and requires that it be tested at 2 amps for the 100% loading condition at the lowest operating output voltage, which can be as low as 3.3 volts.	Address waivers for adaptive EPSs and updates to industry test standard.

To the extent that DOE has tentatively determined that its proposed amendments would impact the measured energy efficiency of an EPS, DOE proposes that testing according to such amendments, if made final, would not be required until such time as compliance is required with new and amended energy conservation standards, should such standard be established or amended. DOE has also tentatively determined that the proposal, if adopted, would not be unduly burdensome to conduct. DOE’s proposed actions are addressed in detail in section III of this document.

III. Discussion

A. Scope of Applicability

1. Scope of Appendix Z

In this SNOPR, DOE proposes to revise section 1 of appendix Z, which specifies the scope of the EPS test procedure, by removing references to direct operation EPSs and

indirect operation Class A EPSs and instead state that the test procedure's scope includes all EPSs subject to the energy conservation standards set forth at 10 CFR 430.32(w)(1), except for those that meet the definition of a "commercial and industrial power supply" as defined in 10 CFR 430.2.

Deleting references to direct operation EPSs and indirect operation Class A EPSs from the scope section of the EPS test procedure at appendix Z would not alter the scope or the applicability of appendix Z. The test procedure to test direct operation and indirect operation EPSs is the same for both types of EPSs, and including these terms in the scope is unnecessary; therefore, DOE is proposing to remove the references.

Also, as part of the December 2019 NOPR, DOE proposed to define "commercial and industrial power supply" and exclude it from the definition of an EPS altogether. In this SNOPR, DOE proposes to maintain the current definition of an EPS and instead use the definition of a "commercial and industrial power supply" to exclude these EPSs from the scope of the appendix as described previously.

DOE requests feedback on its proposal to revise section 1 of appendix Z to remove references to direct operation EPSs and indirect operation Class A EPSs. DOE also requests feedback on its proposal to use the proposed definition of a "commercial and industrial power supply" to exclude such EPSs from the scope of the EPS test procedure.

2. Devices for which the Primary Load of the Converted Voltage is not Delivered to a Separate End Use Product

In response to inquiries as to whether the EPS test procedure permits non-EPS-related functions to be disconnected when testing products with universal serial bus (“USB”) ports, DOE proposed in the December 2019 NOPR to specify that components and circuits unrelated to the EPS’s functionality may be disconnected during testing as long as that disconnection does not impact the functionality of the EPS itself. 80 FR 67106, 67115 (December 6, 2019). For example, a surge protector with USB output ports may be tested with the surge protector circuit disconnected if it is distinct from the USB circuit and does not impact the EPS’s functionality (*i.e.*, the circuit from household AC input to the USB output). *Id.*

Additionally, in a request for information (“RFI”) regarding the energy conservation standards for EPSs published on May 20, 2020 (“May 2020 RFI”), DOE solicited comment regarding how to differentiate between EPSs and products with power conversion as an auxiliary function. 85 FR 30636, 30639. DOE received comments that mostly supported the exclusion of devices with power conversion as an auxiliary function from EPS regulations.

In response to the December 2019 NOPR, CTA and NEMA/ALA raised concern that the proposed amendment would expand the scope of what is covered as an EPS as a result of what they understood to be a proposal to consider all devices with power conversion as an ancillary function (specifically products with USB, HDMI, CAT5, or similar ports) to be within the scope of EPS regulations. (CTA, No. 11 at pp. 3-4; NEMA/ALA, No. 12 at pp. 1-3, 6)

CTA commented that DOE’s proposed addition of regulatory language referencing “circuits” in section 4(h) of the proposed amendments to appendix Z may

lead to questions about the scope of the EPS regulations if DOE intends to further classify circuits as a type of EPS. (CTA, No. 11 at pp. 3-4) CTA also asserted that devices such as laptops, connected televisions, and mobile phone docking ports would potentially be brought under EPS regulations if devices with USB, HDMI, CAT5 or similar ports are considered EPSs. (CTA, No. 11 at p. 4) In addition, CTA raised the concern of potential double regulations for certain products that contain USB ports and are also subject to other energy conservations standards for another product, such as battery chargers. (CTA, No. 11 at p. 3) CTA recommended that DOE classify EPSs with other major functions into a separate product class, and state that such products are not subject to current EPS regulations. (CTA, No. 11 at p. 4)

NEMA/ALA stated that it would be impractical for DOE to enforce EPS regulations upon every product containing a USB, HDMI, or RJ-45 port. (NEMA/ALA, No. 12 at p. 1) NEMA/ALA also raised the issue of double regulations, stating that many devices, including commercial devices, whose energy use or energy efficiency is already regulated under EPCA, contain ports that provide power as an ancillary function. (NEMA/ALA, No. 12 at pp. 1-2) NEMA/ALA suggested creating a definition for a “non-primary power supply,” or a similar term, that would encompass devices with power conversion as an ancillary function and exclude such devices from the definition of an EPS. (NEMA/ALA, No. 12 at pp. 2-3) NEMA/ALA also suggested amending the definition of an EPS to explicitly state that the presence of a USB, HDMI, or RJ-45 port (or similar) as a secondary or ancillary feature does not qualify the product as an EPS. (NEMA/ALA, No. 12 at pp. 5-6)

As discussed in section I.A of this document, EPCA defines EPS broadly as “an external power supply circuit that is used to convert household electric current into DC

current or lower-voltage AC current to operate a consumer product.” (42 U.S.C. 6291(36)(A)(i)) The use of the term “external power supply circuit” in the proposed amendment to allow non-EPS functions to be disconnected would not change the scope of EPS regulations.

In response to the May 2020 RFI’s solicitation for comment on devices with power conversion as an auxiliary function, The Power Tool Institute (“PTI”) and, separately, a collaboration of various industry commenters consisting of The Association of Home Appliance Manufacturers (“AHAM”), Information Technology Industry Council (“ITI”), Plumbing Manufacturers International (“PMI”), and PTI (collectively, the “Joint Commenters”) asserted that such devices fall out of the scope of EPS regulations and should not be subject to regulations unless DOE were to prescribe a standard specific to the end-use product. (Docket No. EERE-2020-BT-STD-0006, PTI, No. 4 at p. 1; Docket No. EERE-2020-BT-STD-0006, Joint Commenters, No. 10 at p. 2) The Joint Commenters further opposed the development of regulations for EPSs that are components of a product. (Docket No. EERE-2020-BT-STD-0006, Joint Commenters, No. 10 at p. 2)

In related comments received in response to the May 2020 RFI, the Northwest Energy Efficiency Alliance (“NEEA”), Natural Resource Defense Council (“NRDC”), and the Appliance Standards Awareness Project (“ASAP”) (hereafter, “NEEA/NRDC/ASAP”) and the CA IOUs commented that devices with power conversion as an auxiliary function are becoming increasingly more common on the market. (Docket No. EERE-2020-BT-STD-0006, NEEA/NRDC/ASAP, No. 6 at p. 12; Docket No. EERE-2020-BT-STD-0006, CA IOUs, No. 7 at pp. 8-9) NEEA/NRDC/ASAP asserted that these types of devices should be subject to EPS

regulations. (Docket No. EERE-2020-BT-STD-0006, NEEA/NRDC/ASAP, No. 6 at p. 13) Additionally, NEEA/NRDC/ASAP stated that power supplies serving an auxiliary function in a device could consume significantly more energy in active and/or no-load modes as a result of these devices not being subject to EPS regulations. (Docket No. EERE-2020-BT-STD-0006, NEEA/NRDC/ASAP, No. 6 at pp. 12-13) The CA IOUs recommended that DOE evaluate the overall potential for covering products with power conversion as a secondary function and that DOE conduct a verification study to compare the energy performance of these types of devices to EPSs that are not included in a finished product as a secondary component. (Docket No. EERE-2020-BT-STD-0006, CA IOUs, No. 7 at pp. 8-9)

As discussed in section I.A of this document, EPCA defines “external power supply” as “an external power supply circuit that is used to convert household electric current into DC current or lower-voltage AC current to operate a consumer product.” (42 U.S.C. 6291(26)(A)(i)). The term does not include a power supply circuit, driver, or device that is designed exclusively to be connected to, and power: light-emitting diodes providing illumination; organic light-emitting diodes providing illumination; or ceiling fans using direct current motors. (42 U.S.C. 6291(26)(A)(ii)).

The proposed amendment in the December 2019 NOPR regarding the disconnection of components and circuits unrelated to the EPS functionality is for the purpose of providing additional instruction for the testing of EPSs that are currently subject to testing and that provide other functions unrelated to the power supply function. 84 FR 67106, 67115 (December 6, 2019). Use of the term “circuit” in the proposed direction that any functionality that is unrelated to the external power supply circuit may be disconnected during testing is consistent with the EPCA definition of an EPS. In the

December 2019 NOPR, by way of example, DOE discussed an EPS that also provides the function of a surge protector with USB output ports as an example of an EPS with other major functions that may be disconnected during testing as long as that disconnection does not impact the functionality of the EPS itself. *Id.* DOE is maintaining the proposal as presented in the December 2019 NOPR.

In reviewing the comments to the NOPR as well as questions received via the Compliance Certification Management System, DOE also understands there may be uncertainty as to the devices subject to the test procedure. As noted, the test procedure applies to EPSs subject to the energy conservation standards at 10 CFR 430.32(w)(1). There are devices that are covered by the definition of EPS but that are not subject to the energy conservation standards and were not considered in the establishment of the energy conservation standards (*e.g.*, a television that has a USB port that also provides converted power). In order to provide further instruction regarding the scope of the test procedure, in addition to the proposed instruction regarding the disconnection of components and circuits unrelated to the EPS functionality, DOE proposes to add instructions as to certain devices excluded from the test procedure. Specifically, DOE proposes to specify that devices for which the primary load of the converted voltage within the device is not delivered to a separate end use product are not subject to the test procedure.

DOE intends for this proposed amendment to clarify that devices that provide power conversion only as an auxiliary operation (*e.g.*, televisions, laptop computers, and home appliances with USB output ports) are not subject to the test procedure. Devices containing USB output ports would remain in scope to the extent the USB output port represents the primary load of the device that houses the USB output port. Examples of such a device could include a surge protector with USB output ports, power-over-ethernet injectors, and wall outlets with USB output ports. As stated, DOE does not intend for

this proposed amendment to change the existing scope but to instead provide manufacturers with additional certainty regarding those EPSs for which testing is required.

DOE requests comment on the proposed clarification in appendix Z to exclude explicitly those devices for which the primary load of the converted voltage within the device is not delivered to a separate end use product. Specifically, whether it adequately clarifies which devices are subject to the test procedure, and if not, how the test procedure could be further modified to provide further clarity regarding its scope.

B. Location of EPS Definitions

In the December 2019 NOPR, DOE proposed moving all EPS-related definitions that are currently defined in 10 CFR 430.2 to the EPS test procedure at appendix Z. 84 FR 67106, 67115 (December 6, 2019). Specifically, DOE proposed to move the definitions of “adaptive external power supply”, “basic-voltage external power supply”, “direct operation external power supply”, “indirect operation external power supply”, and “low-voltage external power supply” from 10 CFR 430.2 to appendix Z. DOE did not propose to amend these definitions. *Id.* However, in this SNOPR, DOE is no longer proposing such a relocation because, except for the term “adaptive external power supply,” these terms are not used elsewhere in the test procedure. Because the terms “basic-voltage external power supply”, “direct operation external power supply”, “indirect operation external power supply”, and “low-voltage external power supply” are not used in the test procedure, those terms are more appropriately located in the general definitions section at 10 CFR 430.2. The term “adaptive external power supply” is

specific to the test procedure, and, for ease of reference, DOE is proposing to move that definition to appendix Z.

In the December 2019 NOPR, DOE also proposed to include the definition of “Class A external power supply” in appendix Z while also retaining it at 10 CFR 430.2, where it currently exists. 84 FR 67106, 67115 (December 6, 2019). However, in this SNOPR, DOE proposes to retain the definition of a “Class A external power supply” only at 10 CFR 430.2 and not include it in the EPS test procedure at appendix Z because this term is not used in the EPS test procedure itself.

DOE requests feedback on maintaining the definitions of “Class A external power supply”, “basic-voltage external power supply”, “direct operation external power supply”, “indirect operation external power supply”, and “low-voltage external power supply” in their current location at 10 CFR 430.2. DOE also requests comment on the proposed relocation of the definition of “adaptive external power supply” to appendix Z.

C. Testing EPSs that are not Supplied with an Output Cord

The current EPS test procedure requires EPSs to be tested with the DC output cord supplied by the manufacturer. appendix Z, sec. 4(a)(i)(A). In a final rule published August 25, 2015 (“August 2015 final rule”), which established the current requirements regarding testing with the power cord, DOE stated that allowing an EPS to be tested without the power cord would ignore the losses associated with the cord and allow for an EPS that is less efficient than the efficiency standards intended. 80 FR 51424, 51429. Accordingly, DOE specified that EPSs must be tested with the output cord supplied by the manufacturer. *Id.*.

DOE received multiple stakeholder inquiries regarding how to test EPSs that are not shipped with a DC output cord. In response to these inquiries, in the December 2019 NOPR, DOE proposed to amend the test procedure to explicitly state that if a wire or cord is not supplied by the manufacturer, then the EPS shall be tested at the output electrical contact that can be connected to a physical wire. 84 FR 67106, 67124 (December 6, 2019). DOE did not receive any comments on this amendment.

Since the analysis conducted in support of the December 2019 NOPR, DOE has observed an increasing number of EPSs that are not packaged or supplied with an accompanying DC output cord.^{8, 9, 10} For example, as USB EPSs become more ubiquitous, it is likely that many consumers already own a USB cable, thereby reducing the demand for EPSs to be supplied with a USB output cord. The current test procedure does not provide explicit instructions to address this scenario, and DOE recognizes that the absence of these instructions may result in manufacturers testing such an EPS without the output cord, when in actual use they are likely used in conjunction with a cord already owned by the consumer. Testing an EPS without an output cord would ignore the losses that are associated with using the EPS with the cord in the real-world and, therefore, the rated efficiency of such an EPS would not be representative of real-world use (*i.e.*, the rated efficiency of an EPS tested without an output cord would be higher than that seen in real-world use). Additionally, the type of cord used to test such an EPS would also

⁸ LENCENT USB Wall Charger Plug, 2Pack 17W 3-Port USB Plug CubePortable Charger sold on newegg.com; www.regulations.gov/document/EERE-2019-BT-TP-0012-0015.

⁹ ORICO DCAP-5U 5-Port USB Wall Charger adapter sold on newegg.com; www.regulations.gov/document/EERE-2019-BT-TP-0012-0014.

¹⁰ Sony Camera Charger UB10 USB to AC Power Adapter sold on newegg.com, www.regulations.gov/document/EERE-2019-BT-TP-0012-0016

impact the measured efficiency because different cords may have different cord losses, thereby impacting the repeatability and reproducibility of the test procedure.

As such, in order to improve the representativeness and repeatability and reproducibility of the EPS test procedure, DOE is proposing to revise the procedure to explicitly state that if an EPS is not supplied with an output cord, then the EPS shall be tested with an output cord that is recommended for use by the manufacturer. If an EPS contains multiple output busses, each output bus would be tested with an output cord that is recommended for use by the manufacturer. Specifically, proposed Section 4(g)(1) of appendix Z would require testing each output port of an external power supply at the end of the wire or cord that connects to an end-use product, regardless of whether the end of the wire or cord is integrated into an end-use product or plugs into and out of an end-use product. If a separate wire or cord is provided by the manufacturer to connect the external power supply to an end-use product, this wire or cord would be used and testing would be performed at the end of the cord that connects to an end-use product. If a wire or cord is not supplied by the manufacturer, the external power supply would be tested with an output cord recommended for use by the manufacturer.

As indicated in the August 2015 final rule, the choice of power cord when testing may impact the measured energy use of an EPS. 80 FR 51424, 51429 (August 25, 2015). It is uncertain the extent to which this proposed amendment would impact the measured energy use of EPSs that are currently certified. If adopted, testing to this provision would not be required until such time as compliance is required with amended energy conservation standards, should such standards be adopted.

DOE requests comment on its proposed amendments for EPSs that are not supplied with output cords; and specifically, DOE requests comment on whether the test procedure should specify testing with a DC output cord recommended for use by manufacturers, or whether DOE should specify electrical specifications (*i.e.*, cord length, gauge, material) for the type of cord. For example, DOE could prescribe a table, as shown below, that contains electrical specifications of DC output cords for various ranges of nameplate output currents at the 100% loading condition.

Table III-I. Example Output Cord Electrical Specifications

DC Output Current at 100% Loading Condition (amps)	Cord Length (feet)	Conductor	American Wire Gauge
$0 < I \leq 1$	3	Copper	26
$1 < I \leq 2$	3	Copper	24
$2 < I \leq 3$	3	Copper	22
$3 < I \leq 4$	3	Copper	20
$4 < I \leq 5$	3	Copper	18
$I > 5$	3	Copper	16

These example electrical specifications are based on common electrical specifications of output cords that DOE has observed in the market.

If DOE were to prescribe electrical specifications for output cords, DOE seeks input from industry on what those electrical specifications should be, and/or whether there exists an industry standard that contains specifications for electrical cables, which DOE could incorporate by reference.

D. USB-PD EPSs with Additional Optional Voltages and Currents and Programmable Power Supplies

In the December 2019 NOPR, DOE proposed to adopt a test procedure for USB-PD EPSs (also called adaptive EPSs) that was prescribed in several granted test procedure waivers (*i.e.*, case Nos. EPS-001, EPS-002, EPS-003, EPS-004, 2017-014, 2018-005, and 2018-010¹¹). 84 FR 67106, 67111 – 67113 (December 6, 2019). An adaptive EPS is one with an output bus¹² that can alter its output voltage based on an established digital communication protocol with the end-use application without any user-generated action. As described in the December 2019 NOPR, in granting the test procedure waivers for certain basic models of adaptive EPSs, DOE determined that, while such EPSs are very much in scope of the existing test procedure, continuing to apply the current set of instructions in appendix Y to them would yield results that would be unrepresentative of the active-mode efficiency of those products. 84 FR 67106, 67112 (December 6, 2019). In granting the test procedure waivers, DOE concluded that when using a USB-PD EPS to charge an end-use product at the lowest voltage level of 5 volts, the product would rarely draw more than 2 amps of current (*i.e.*, a power draw of more than 10W). *See* 83 FR 11738, 11739 (December 6, 2019). Nonetheless, for a USB-PD EPS with a nameplate output current of 3 amps, the current DOE test procedure requires

¹¹ *See also* Case No. 2019-005.

¹² An “output bus” is defined as “any of the outputs of the power supply to which loads can be connected and from which power can be drawn, as opposed to signal connections used for communication.” Section 2 of appendix Z.

that the EPS's efficiency be measured at a current of 3 amps at the lowest voltage condition of 5 volts (*i.e.*, a power draw of 15W). As a result, the efficiency of that EPS, when evaluated at that higher power draw (15W v. 10W), would result in a measurement that is unrepresentative of the actual energy consumption characteristics of the USB-PD EPS being tested. *See Id.*

USB-PD EPSs covered by the referenced waivers must be tested such that when testing at the lowest achievable output voltage (*i.e.*, 5 volts), the output current shall be 2 amps (corresponding to an output power of 10W) at the 100% loading condition. The 75%, 50%, and 25% loading conditions are scaled accordingly under this alternate procedure (*i.e.*, 1.5 amps, 1 amp, and 0.5 amps, respectively). When tested in this manner, the resulting power draws are 10W, 7.5W, 5W, and 2.5W; this result is in contrast to the existing test procedure at appendix Z, which requires power draws of 15W, 11.25W, 7.5W, and 3.75W at the 100%, 75%, 50%, and 25% loading conditions, respectively. *See* 83 FR 11738, 11739-11740 (March 16, 2018). As a result, in the December 2019 NOPR, DOE proposed to amend appendix Z to adopt the alternate test procedure applicable to the adaptive EPSs covered by the test procedure waivers. 84 FR 67106, 67113 (December 6, 2019).

In response to the proposed definition of USB-PD EPS, ITI stated that the limitation in current and voltage (via the phrase “the voltages and currents must not exceed”) should be removed to avoid excluding USB-PD EPSs with additional optional additional voltages and currents.¹³ (ITI, No. 13 at p. 3) According to ITI, the additional

¹³ The IEC 62680-1-2 specification describes the architecture, protocols, power supply behavior, connectors, and cabling necessary for managing power delivery over a USB. In addition to those voltage and current requirements specified in the previously proposed definition of a USB-PD EPS, stakeholders commented that IEC 62680-1-2 also specifies additional optional voltage and current limits for USB-PD EPSs that should be included.

optional voltages and currents ensure that temperatures can be optimized inside laptop computers. (*Id.*) Moreover, ITI commented that the proposed definition of a USB-PD EPS does not include PPSs, which is defined in IEC 62680-1-2. (*Id.*) ITI stated that PPSs are able to output a minimum voltage of 3.3 volts, in contrast to the minimum voltage of 5 volts as specified in the proposed definition of a USB-PD EPS, such that equating the 2A loading condition with 10W (*i.e.*, 2 amps at 5 volts) creates a conflict when used with a PPS. (*Id.*) Accordingly, ITI recommended that DOE replace reference to “10W” with reference to “2A at the lowest nameplate output voltage.” (*Id.*)

The alternate test procedure prescribed in the waivers references IEC 62680-1-2:2017 and specified the voltage and current requirements contained therein. *See* 84 FR 59365 (November 4, 2019); 83 FR 60830 (November 27, 2018); 83 FR 50905 (October 10, 2018); 83 FR 25448 (June 1, 2018); and 83 FR 11738 (March 16, 2018). The definition for USB-PD EPSs proposed in the December 2019 NOPR used the specific voltage and current requirements from IEC 62680-1-2:2017 as referenced in the waiver petitions (*i.e.*, requiring USB-PD EPSs to be rated at 3 amps at an output voltage of 5 volts, and: at no more than 3 amps at 9 volts; at 3 amps at 15 volts, and; at 5 amps at 20 volts) and required that only USB-PD EPSs meeting the proposed definition would be subject to the proposed test procedure. 84 FR 67106, 67113 (December 6, 2019). PPSs were not specified in IEC 62680-1-2 until a revised version, IEC 62680-1-2:2018, published on April 12, 2018.

DOE expects USB-PD EPSs with optional voltages and currents and PPSs to become more common in the market in the future as more end-use applications incorporate USB-PD for charging purposes. Moreover, because PPSs employ the same communication technology as USB-PD EPSs, DOE expects PPSs to rarely draw more

than 2 amps of current at a lowest nameplate output 3.3 volts, similar to USB-PD EPSs with a lowest nameplate output voltage of 5 volts. Similarly, DOE expects USB-PD EPSs with additional optional voltages and currents, which can also have a lowest nameplate output voltage as low as 3.3 volts, to also rarely draw more than 2 amps of current at that output voltage.

In this SNOPR, DOE proposes to modify the proposed definition of a USB-PD EPS in order to include USB-PD EPSs with additional optional voltages and currents and PPSs, consistent with the updated industry standard. By modifying the definition of USB-PD EPS such that it would include PPS and USB-PD EPSs with additional optional voltages and currents, such products would be tested according to the alternate test procedure prescribed for USB-PD EPSs in the December 2019 NOPR.

In summary, DOE proposes to define USB-PD EPS as an adaptive EPS that utilizes a USB Type-C output port and uses a digital protocol to communicate between the EPS and the end-user product to automatically switch between any output voltage within the range of 3.3 volts to 20 volts. The USB-PD output bus must be capable of delivering 3 amps at the lowest output voltage, and the currents must not exceed any of the following values for the supported voltages: 3 amps at 9 volts; 3 amps at 15 volts; and 5 amps at 20 volts.

DOE also proposes to revise the definition of nameplate output power in order to provide for testing of PPSs and USB-PD EPSs with additional optional voltages and currents at 2 amps at the lowest nameplate output voltage, instead of at 5 volts, as was previously specified in the definition of nameplate output power. DOE proposes to revise the definition of nameplate output power to mean the power output of the power supply

as specified on the manufacturer's label on the power supply housing or, if absent from the housing, as specified in documentation provided by the manufacturer. For an adaptive external power supply with USB-PD ports, the nameplate output power is the product of its lowest nameplate output voltage and 2 amps for each USB-PD port and as specified on the manufacturer's label or documentation at the highest voltage.

The proposed definition would result in PPSs and USB-PD EPSs with additional optional voltages and currents being tested according to the same alternate test procedure provided for USB-PD EPSs in the December 2019 NOPR.

DOE is not aware of any PPSs or USB-PD EPSs with additional optional voltages and currents on the market certified as EPSs, and thus DOE does not expect the proposed amendments to require the retesting or recertification of any basic EPS models.

DOE requests comments on the proposed amendments related to PPSs and USB-PD EPSs with optional voltages and currents.

E. Test Procedure Costs and Impact

In this SNOPR, DOE is proposing to clarify the scope of the EPS test procedure at appendix Z by removing references to direct operation and indirect operation Class A EPSs and providing additional detail regarding the subject EPSs. DOE is also proposing to (1) maintain the placement of certain definitions at 10 CFR 430.2 that DOE initially proposed to move to appendix Z in the NOPR, (2) provide additional specification for the testing of EPSs that do not ship with an output cord, and (3) align the testing requirements for PPS with those for USB-PD EPSs.

DOE has tentatively determined that the proposed amendments would not be unduly burdensome for manufacturers to conduct. Further details regarding the cost impact of the proposed amendments are presented in the following paragraphs.

1. Scope of Applicability

In this SNOPR, DOE proposes to amend the EPS test procedure in appendix Z to provide additional clarity as to those EPSs subject to the test procedure. The proposal would remove reference in the scope section to direct operation EPSs and indirect operation Class A EPSs, as reference to these terms is duplicative with the instruction that the scope of the test procedure are those EPSs subject to standards. DOE also proposes to provide additional detail as to the products subject to the test procedure by noting that devices for which the primary load of the converted voltage within the device is not delivered to a separate end use product are not covered. DOE has tentatively determined that neither of these amendments would change the scope of the EPS test procedure. As such, the proposed amendments to the scoping language would not change (1) the scope of the products subject to the test procedure, (2) the cost to conduct the test procedure, or (3) the cost incurred by manufacturers to re-test any currently covered EPSs. Accordingly, these proposed amendments would not impact the test burden for any EPS manufacturer.

DOE requests comment on its initial determination that the proposed amendments regarding the scope of appendix Z, if finalized, would not cause any EPS manufacturers to incur any additional costs.

2. Testing EPSs that are not Supplied with an Output Cord

DOE proposes to specify that those EPSs that are not supplied with an output cord would be tested using an output cord recommended by the manufacturer. The current test procedure does not provide explicit instructions on how to test EPSs that are not supplied with an output cord. This proposed amendment would explicitly require EPS manufacturers to conduct the test at the end of an output cord that is connected to the output electrical contact. The addition of an output cord would introduce electrical losses in the test setup and would thus impact the efficiency measurement of an EPS. DOE acknowledges that the proposals related to the testing of EPSs that are not supplied with an output cord could impact the measured energy use of certain basic models – specifically, those models that were tested without an output cord or with an output cord different from what would be required by the proposed amendment. However, this proposal, if adopted, would not be required until such time as DOE were to amend the energy conservation standards for EPSs. Moreover, were this proposal adopted, it would not result in an increase in test burden as compared to the current test procedure, as it would not require any additional testing steps.

DOE requests comment on its initial determination that the proposed amendment to test EPSs shipped without an output cord with a manufacturer recommended cord, if finalized, would not increase the test burden as compared to the current test procedure once required.

3. USB-PD with Additional Optional Voltages and Currents and Programmable Power Supplies

DOE proposes to amend the definition of a USB-PD EPS, as proposed in the December 2019 NOPR, in order to include USB-PD EPSs with additional optional

voltages and currents and PPSs. DOE is not aware of any USB-PD EPSs with additional optional voltages and currents or PPSs that are currently certified in DOE's Compliance Certification Database ("CCD"). Further, DOE has not received any waiver petitions under 10 CFR 430.27 for USB-PD EPSs with additional optional voltages and currents or PPSs. Accordingly, based on currently available data, DOE has preliminarily concluded that the proposed amendments would not alter the measured energy efficiency of any EPS basic models currently certified in DOE's CCD. Hence, manufacturers would not incur any additional costs compared to the existing test procedure.

DOE has preliminarily concluded that the proposed amendments, if finalized, would not impact the scope of the test procedure (*i.e.*, the proposal would not require manufacturers to test EPSs that are not already required to be tested) and would not alter the measured energy efficiency of EPSs under either the current test procedure or the alternate test procedure required under currently active test procedure waivers. For adaptive EPSs that meet the IEC 62680-1-2 specification (including PPSs and USB-PD EPSs with optional voltages and currents), the proposed approach is the same one required under the granted waivers. *See* 83 FR 11738 (March 16, 2018) (initial Decision & Order on joint waiver request from Apple, et al.), 83 FR 25448 (June 1, 2018) (Decision & Order on waiver request Huawei), 83 FR 50905 (October 10, 2018) (first waiver extension for Apple), and 83 FR 60830 (November 27, 2018) (second waiver extension for Apple). Moreover, DOE is not aware of any PPSs or USB-PD EPSs with additional optional voltages and currents on the market certified as EPSs, and thus DOE does not expect the proposed amendments to require the retesting or recertification of any basic EPS models. Accordingly, based on currently available data, DOE has preliminarily concluded that the proposed amendments would not alter the measured energy efficiency for such adaptive EPSs. Manufacturers would be able to continue to

rely on data generated under the current test procedure, including any alternate test procedure permitted by DOE under a manufacturer-specific decision and order, should any of the proposed amendments be finalized.

DOE requests comment on its initial determination that its proposed amendment for USB-PD EPSs, if finalized, would not cause any EPS manufacturers to incur any additional costs.

F. Compliance Date and Waivers

EPCA prescribes that all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with an amended test procedure beginning 180 days after publication of such a test procedure final rule in the *Federal Register*. (42 U.S.C. 6293(c)(2)) The 180 day mandate applies to all test procedure changes in this proposed rule with the exception of proposed amendments related to testing EPSs that are not supplied with an output cord. Those requirements, if finalized, would not be required until such time as DOE were to amend the energy conservation standards for EPSs. As discussed previously in this document, appendix Z does not explicitly provide instructions for testing EPSs that are supplied without an output cord. Currently, a manufacturer may choose to test with a recommended output cord. Under the proposed test procedure, a manufacturer would be required to test with a recommended output cord only at such time as compliance is required with amended energy conservation standards, should such standards be amended.

If DOE were to publish an amended test procedure, EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 180-day period if the

manufacturer would experience undue hardship in meeting the deadline. (42 U.S.C. 6293(c)(3)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the 180-day period and must detail how the manufacturer will experience undue hardship. (*Id.*)

Should DOE amend the test procedure to address the issues presented in a waiver, the waiver would automatically terminate on the date on which use of that test procedure is required to demonstrate compliance. 10 CFR 430.27(h)(3). Recipients of any such waivers would be required to test those products that were subject to the waiver according to the amended test procedure as of the effective date of the amended test procedure. 10 CFR 430.27(i)(2). As part of this SNOPR, DOE continues to propose to adopt the alternate test procedure required under the waivers granted to Apple, Microsoft, Poin2, Bitland, and Huawei for testing USB-PD EPSs (Case Nos. EPS-001, EPS-002, EPS-003, and EPS-004), with the modifications discussed above to address PPSs. If the proposed amendments regarding the testing of adaptive EPSs were made final, the waivers issued to Apple, Microsoft, Poin2, Bitland, and Huawei would expire on the date on which testing were required using the amended test procedure. At such time Apple, Microsoft, Poin2, Bitland, and Huawei would be required to test the EPSs subject to the waivers according to the amended Federal test procedure.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

The Office of Management and Budget (“OMB”) has determined that this test procedure rulemaking does not constitute a “significant regulatory action” under section 3(f) of Executive Order 12866, Regulatory Planning and Review, 58 FR 51735 (October

4, 1993). Accordingly, this action was not subject to review under the Executive order by the Office of Information and Regulatory Affairs (“OIRA”) in OMB.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of an initial regulatory flexibility analysis (“IRFA”) for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. A regulatory flexibility analysis examines the impact of the rule on small entities and considers alternative ways of reducing negative effects. As required by Executive Order 13272, “Proper Consideration of Small Entities in Agency Rulemaking,” 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003 to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel’s website:

www.energy.gov/gc/office-general-counsel.

DOE reviewed this test procedure SNOPR pursuant to the Regulatory Flexibility Act and the procedures and policies previously discussed. DOE has concluded that this rule would not have a significant impact on a substantial number of small entities. The factual basis for this certification is set forth below. DOE will consider any comments on the certification in determining whether to adopt the proposed amendments to the test procedure contained in this document.

For manufacturers of EPSs, the Small Business Administration (“SBA”) has set a size threshold, which defines those entities classified as “small businesses” for the

purposes of the statute. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the requirements of the rule. 13 CFR part 121. The size standards are listed by North American Industry Classification System (“NAICS”) code and industry description and are available at www.sba.gov/document/support--table-size-standards. EPS manufacturing is classified under NAICS 335999, “All Other Miscellaneous Electrical Equipment and Component Manufacturing.” The SBA sets a threshold of 500 employees or less for an entity to be considered as a small business in this category.

As previously discussed in section III.E, DOE does not anticipate that any EPS manufacturer, large or small, would incur any additional testing costs as a result of these proposed test procedure amendments, if finalized.

Therefore, DOE concludes that the impacts of the proposed test procedure amendments proposed in this SNOPR would not have a “significant economic impact on a substantial number of small entities,” and that the preparation of an IRFA is not warranted. DOE will transmit the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

DOE requests comment on its initial determination that no small businesses would incur any additional cost due to the proposed test procedure amendments, if finalized, until compliance with a future energy conservation is required.

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of EPSs must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including EPSs. (10 CFR part 429, subpart B.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (“PRA”). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The proposals presented in this SNOPR, if adopted, would not require the recertification of any basic model currently certified on the CCD nor would they require the reporting of information not currently required.

Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

D. Review Under the National Environmental Policy Act of 1969

In this proposed rule, DOE proposes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for external power supplies. DOE has determined that this proposed rule falls into a class of actions

that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, DOE has determined that adopting test procedures for measuring energy efficiency of consumer products and industrial equipment is consistent with activities identified in 10 CFR part 1021, appendix A to subpart D, A5 and A6. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, "Federalism," 64 FR 43255 (August 10, 1999), imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The Executive order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE has examined this proposed rule and has determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set

forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, “Civil Justice Reform,” 61 FR 4729 (February 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; (3) provide a clear legal standard for affected conduct rather than a general standard; and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that executive agencies make every reasonable effort to ensure that the regulation: (1) clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, the proposed rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (“UMRA”) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of \$100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed “significant intergovernmental mandate,” and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at www.energy.gov/gc/office-general-counsel. DOE examined this proposed rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of \$100 million or more in any year, so these requirements do not apply.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This proposed rule would not have any

impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, “Governmental Actions and Interference with Constitutionally Protected Property Rights” 53 FR 8859 (March 18, 1988), that this proposed regulation would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

J. Review Under Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB’s guidelines were published at 67 FR 8452 (February 22, 2002), and DOE’s guidelines were published at 67 FR 62446 (October 7, 2002). DOE has reviewed this proposed rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any proposed significant energy action. A “significant energy action” is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and

that: (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

The proposed regulatory action to amend the test procedure for measuring the energy efficiency of EPSs is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under Section 32 of the Federal Energy Administration Act of 1974

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; “FEAA”) Section 32 essentially provides in relevant part that, where a proposed rule authorizes or requires use of commercial standards, the notice of proposed rulemaking must inform the public of the use and background of such standards. In addition, section 32(c) requires DOE to consult with the Attorney General and the Chairman of the Federal Trade Commission (“FTC”) concerning the impact of the commercial or industry standards on competition.

The proposed modifications to the test procedure for EPSs do not incorporate any new industry standards.

M. Description of Materials Incorporated by Reference

In this SNOPR, DOE proposes to maintain the current incorporation by reference of IEC 62301 Ed. 2.0, and create a new section 1 in appendix Z, titled “incorporation by reference”, to enumerate the specific provisions of the standard that are applicable to the EPS test procedure in appendix Z. Specifically, section 1 of appendix Z would limit use of the material incorporated by reference to the following sections of the IEC 62301:

IEC 62301, “Household electrical appliances – Measurement of standby power,” Edition 2.0, 2011-01:

- Section 4.4.1, “Power measurement uncertainty”;
- Section 5.3.3, “Average reading method”;
- Annex B, “Notes on the measurement of low power modes”; and
- Annex D, “Determination of uncertainty of measurement”.

IEC 62301 is an industry-accepted standard for measuring the standby power of household electrical appliances. This standard is reasonably available and can be obtained from the American National Standards Institute at the following address:

American National Standards Institute, 25 W. 43rd Street, 4th Floor, New York, NY 10036, (212) 642-4936, or by visiting <https://webstore.ansi.org>.

V. Public Participation

A. Participation in the Webinar

The time and date of the webinar meeting are listed in the **DATES** section at the beginning of this document. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website:

https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid

=1. Participants are responsible for ensuring their systems are compatible with the webinar software.

B. Procedure for Submitting Prepared General Statements for Distribution

Any person who has an interest in the topics addressed in this SNOPR, or who is representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation at the webinar. Requests should be sent by email to: ApplianceStandardsQuestions@ee.doe.gov. Persons who wish to speak should include with their request a computer file in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format that briefly describes the nature of their interest in this rulemaking and the topics they wish to discuss. Such persons should also provide a daytime telephone number where they can be reached.

Persons requesting to speak should briefly describe the nature of their interest in this rulemaking and provide a telephone number for contact. DOE requests persons selected to make an oral presentation to submit an advance copy of their statements at least two weeks before the webinar. At its discretion, DOE may permit persons who cannot supply an advance copy of their statement to participate, if those persons have made advance alternative arrangements with the Building Technologies Office. As necessary, requests to give an oral presentation should ask for such alternative arrangements.

C. Conduct of the Webinar

DOE will designate a DOE official to preside at the webinar and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with section 336 of EPCA (42 U.S.C. 6306). A court reporter will be present to record the proceedings and prepare a transcript. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the webinar. There shall not be discussion of proprietary information, costs or prices, market share, or other commercial matters regulated by U.S. anti-trust laws. After the webinar and until the end of the comment period, interested parties may submit further comments on the proceedings and any aspect of the rulemaking.

The webinar will be conducted in an informal, conference style. DOE will present summaries of comments received before the webinar, allow time for prepared general statements by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a

general statement (within time limits determined by DOE), before the discussion of specific topics. DOE will permit, as time permits, other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to this rulemaking. The official conducting the webinar will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification of the above procedures that may be needed for the proper conduct of the webinar.

A transcript of the webinar will be included in the docket, which can be viewed as described in the Docket section at the beginning of this SNOPR. In addition, any person may buy a copy of the transcript from the transcribing reporter.

D. Submission of Comments

DOE will accept comments, data and information regarding this proposed rule no later than the date provided in the **DATES** section at the beginning of this proposed rule. Interested parties may submit comments using any of the methods described in the **ADDRESSES** section at the beginning of this document.

Submitting comments via www.regulations.gov. The www.regulations.gov web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact

information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to *www.regulations.gov* information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information (“CBI”)). Comments submitted through *www.regulations.gov* cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through *www.regulations.gov* before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that *www.regulations.gov* provides after you have successfully uploaded your comment.

Submitting comments via email. Comments and documents submitted via email also will be posted to *www.regulations.gov*. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. No facsimiles (faxes) will be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, written in English and free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well-marked copies: one copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked non-confidential with the information believed to

be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

E. Issues on Which DOE Seeks Comment

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

(1) DOE requests feedback on its proposal to revise section 1 of appendix Z to remove references to direct operation EPSs and indirect operation Class A EPSs. DOE also requests feedback on its proposal to use the proposed definition of a "commercial and industrial power supply" to exclude such EPSs from the scope of the EPS test procedure.

(2) DOE requests comment on the proposed clarification in appendix Z to exclude explicitly those devices for which the primary load of the converted voltage within the device is not delivered to a separate end use product. Specifically, whether it adequately clarifies which devices are subject to the test procedure, and, if not, how the test procedure could be further modified to provide further clarity regarding its scope.

(3) DOE requests feedback on maintaining the definitions of "Class A external power supply", "basic-voltage external power supply", "direct operation external power supply", "indirect operation external power supply",

and “low-voltage external power supply” in their current location at 10 CFR 430.2. DOE also requests comment on the proposed relocation of the definition of “adaptive external power supply” to appendix Z.

(4) DOE requests comment on its proposed amendments for EPSs that are not supplied with output cords; and, specifically, DOE requests comment on whether the test procedure should specify testing with a DC output cord recommended for use by manufacturers, or whether DOE should specify electrical specifications (*i.e.*, cord length, gauge, material) for the type of cord. For example, DOE could prescribe a table, as shown below, that contains electrical specifications of DC output cords for various ranges of nameplate output currents at the 100% loading condition.

(5) DOE requests comments on the proposed amendments related to PPSs and USB-PD EPSs with optional voltages and currents.

(6) DOE requests comment on its initial determination that the proposed amendments regarding the scope of appendix Z, if finalized, would not cause any EPS manufacturers to incur any additional costs.

(7) DOE requests comment on its initial determination that the proposed amendment to test EPSs shipped without an output cord with a manufacturer recommended cord, if finalized, would not increase the test burden as compared to the current test procedure once required.

(8) DOE requests comment on its initial determination that its proposed amendment for USB-PD EPSs, if finalized, would not cause any EPS manufacturers to incur any additional costs.

(9) DOE requests comment on its initial determination that no small businesses would incur any additional cost due to the proposed test procedure

amendments, if finalized, until compliance with a future energy conservation is required.

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this supplemental notice of proposed rulemaking.

List of Subjects in 10 CFR Part 430

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Incorporation by reference, Intergovernmental relations, Small businesses.

Signing Authority

This document of the Department of Energy was signed on October 19, 2021, by Kelly Speakes-Backman, Principal Deputy Assistant Secretary and Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on October 20, 2021

Treena V. Garrett
Federal Register Liaison Officer,
U.S. Department of Energy

For the reasons stated in the preamble, DOE is proposing to amend part 430 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

1. The authority citation for part 430 continues to read as follows:

Authority: 42 U.S.C. 6291–6309; 28 U.S.C. 2461 note.

2. Section 430.2 is amended by:
 - a. Removing the definition of “Adaptive external power supply (EPS)”;
 - b. Adding a definition of “Commercial and industrial power supply” in alphabetical order; and
 - c. Revising the definition of “External power supply”.

The addition and revision read as follows:

§430.2 Definitions.

* * * * *

Commercial and industrial power supply means a power supply that is used to convert electric current into DC or lower-voltage AC current, is not distributed in commerce for use with a consumer product, and includes any of the following characteristics:

- (1) A power supply that require a 3-phase input power and that is incapable of operating on household current;
- (2) A DC-DC only power supply that is incapable of operating on household current;

(3) A power supply with a fixed, non-removable connection to an end-use device that is not a consumer product as defined under the Energy Policy and Conservation Act (as amended);

(4) A power supply whose output connector is uniquely shaped to fit only an end-use device that is not a consumer product;

(5) A power supply that cannot be readily connected to an end-use device that is a consumer product without significant modification or customization of the power supply itself or the end-use device;

(6) A power supply packaged with an end-use device that is not a consumer product, as evidenced by either:

(i) Such device being certified as, or declared to be in conformance with, a specific standard applicable only to non-consumer products. For example, a power supply model intended for use with an end-use device that is certified to any of the following standards would not meet the EPCA definition of an EPS:

(A) CISPR 11 (Class A Equipment), “Industrial, scientific and medical equipment – Radio-frequency disturbance – Limits and methods of measurement”;

(B) UL 1480A, “Standard for Speakers for Commercial and Professional Use”;

(C) UL 813, “Standard for Commercial Audio Equipment”; and

(D) UL 1727, “Standard for Commercial Electric Personal Grooming Appliances”; or

(ii) Such device being excluded or exempted from inclusion within, or conformance with, a law, regulation, or broadly-accepted industry standard where such exclusion or exemption applies only to non-consumer products;

(7) A power supply distributed in commerce for use with an end-use device where:

(i) The end-use device is not a consumer product, as evidenced by either the circumstances in paragraph (6)(i) or (ii) of this definition; and

- (ii) The end-use device for which the power supply is distributed in commerce is reasonably disclosed to the public, such as by identification of the end-use device on the packaging for the power supply, documentation physically present with the power supply, or on the manufacturer's or private labeler's public website; or
- (8) A power supply that is not marketed for residential or consumer use, and that is clearly marked (or, alternatively, the packaging of the individual power supply, the shipping container of multiple such power supplies, or associated documentation physically present with the power supply when distributed in commerce is clearly marked) "FOR USE WITH COMMERCIAL OR INDUSTRIAL EQUIPMENT ONLY" or "NOT FOR RESIDENTIAL OR CONSUMER USE," with the marking designed and applied so that the marking will be visible and legible during customary conditions for the item on which the marking is placed.

* * * * *

External power supply means an external power supply circuit that is used to convert household electric current into DC current or lower-voltage AC current to operate a consumer product. However, the term does not include any "commercial and industrial power supply" as defined in this section, or a power supply circuit, driver, or device that is designed exclusively to be connected to, and power—

- (1) Light-emitting diodes providing illumination;
- (2) Organic light-emitting diodes providing illumination; or
- (3) Ceiling fans using direct current motors.

* * * * *

3. Section 430.23 is amended by revising paragraph (bb) to read as follows:

§430.23 Test procedures for the measurement of energy and water consumption.

* * * * *

(bb) *External Power Supplies*. The energy consumption of an external power supply, including active-mode efficiency expressed as a percentage and the no-load, off, and standby mode energy consumption levels expressed in watts, shall be measured in accordance with appendix Z of this subpart.

* * * * *

4. Appendix Z is revised to read as follows:

Appendix Z to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of External Power Supplies

Note: Starting on [180 days after publication of the final rule in the *Federal Register*], manufacturers must make any representations regarding the energy efficiency or power consumption of external power supplies based upon results generated under this appendix. Prior to that date manufacturers must make any representations regarding the energy efficiency or power consumption of external power supplies based upon results generated under this appendix as it appeared at 10 CFR part 430, subpart B revised as of January 1, 2021. The provisions at section (4)(g)(2) of this appendix regarding the testing of units for which a wire or cord is not provided by the manufacturer are not required for use until such time as compliance is required with any amended standards for external power supplies provided in §430.32(w) that are published after January 1, 2021.

1. Incorporation by reference

DOE incorporated by reference the entire standard for IEC 62301 in §430.3; however, only enumerated provisions of this document are applicable to this appendix, as follows:

(a) IEC 62301, (“IEC 62301”), Household electrical appliances – Measurement of standby power, (Edition 2.0, 2011-01), as follows:

- (i) Section 4.3.2 “Supply voltage waveform”;
- (ii) Section 4.4.1 “Power measurement uncertainty”;
- (iii) Section 5.3.3 “Average reading method”;
- (iv) Annex B “Notes on the measurement of low power modes”; and
- (v) Annex D “Determination of uncertainty of measurement.”

(b) Reserved.

2. *Scope.*

This appendix covers the test requirements used to measure the energy consumption of external power supplies subject to the energy conservation standards set forth at §430.32(w)(1).

3. *Definitions:* The following definitions are for the purposes of understanding terminology associated with the test method for measuring external power supply energy consumption.

Active mode means the mode of operation when the external power supply is connected to the main electricity supply and the output is (or “all outputs are” for external power supplies with multiple outputs) connected to a load (or “loads” for external power supplies with multiple outputs).

Active mode efficiency is the ratio, expressed as a percentage, of the total real output power produced by a power supply to the real input power required to produce it. IEEE Standard 1515-2000, 4.3.1.1 (Reference for guidance only, see §430.4.)

Active power (P) (also *real power*) means the average power consumed by a unit. For a two terminal device with current and voltage waveforms $i(t)$ and $v(t)$, respectively, which are periodic with period T , the real or active power P is:

$$P = \frac{1}{T} \int_0^T v(t)i(t)dt$$

Adaptive external power supply means an external power supply that can alter its output voltage during active-mode based on an established digital communication protocol with the end-use application without any user-generated action.

Ambient temperature means the temperature of the ambient air immediately surrounding the unit under test.

Average Active-Mode Efficiency means the average of the active mode efficiencies at the loading conditions (100%, 75%, 50%, and 25% of unit under test's nameplate output current) for which that unit can sustain the output current.

Manual on-off switch is a switch activated by the user to control power reaching the device. This term does not apply to any mechanical, optical, or electronic switches that automatically disconnect mains power from the device when a load is disconnected from the device, or that control power to the load itself.

Minimum output current means the minimum current that must be drawn from an output bus for an external power supply to operate within its specifications.

Multiple-voltage external power supply means an external power supply that is designed to convert line voltage AC input into more than one simultaneous lower-voltage output.

Nameplate output current means the current output of the power supply as specified on the manufacturer's label on the power supply housing (either DC or AC) or, if absent from the housing, as provided by the manufacturer.

Nameplate output power means the power output of the power supply as specified on the manufacturer's label on the power supply housing or, if absent from the housing, as

specified in documentation provided by the manufacturer. For an adaptive external power supply with USB-PD ports, the nameplate output power is the product of its lowest nameplate output voltage and 2 amps for each USB-PD port and as specified on the manufacturer's label or documentation at the highest voltage.

Nameplate output voltage means the voltage output of the power supply as specified on the manufacturer's label on the power supply housing (either DC or AC).

No-load mode means the mode of operation when an external power supply is connected to the main electricity supply and the output is (or “all outputs are” for a multiple-voltage external power supply) not connected to a load (or “loads” for a multiple-voltage external power supply).

Off-mode is the condition, applicable only to units with manual on-off switches, in which the external power supply is:

- (1) Connected to the main electricity supply;
- (2) The output is not connected to any load; and
- (3) All manual on-off switches are turned off.

Output bus means any of the outputs of the power supply to which loads can be connected and from which power can be drawn, as opposed to signal connections used for communication.

RMS means root mean square.

Single-voltage external AC-AC power supply means an external power supply that is designed to convert line voltage AC input into lower voltage AC output and is able to convert to only one AC output voltage at a time.

Standby mode means the condition in which the external power supply is in no-load mode and, for external power supplies with manual on-off switches, all such switches are turned on.

Switch-selectable single voltage external power supply means a single-voltage AC-AC or AC-DC power supply that allows users to choose from more than one output voltage.

Total harmonic distortion (“THD”), expressed as a percentage, is the RMS value of an AC signal after the fundamental component is removed and interharmonic components are ignored, divided by the RMS value of the fundamental component. THD of current is defined as:

$$THD = \frac{\sqrt{I_2^2 + I_3^2 + I_4^2 + \dots I_n^2}}{I_1}$$

where I_n is the RMS value of the n th harmonic of the current signal.

Unit under test (“UUT”) is the external power supply being tested.

USB Power Delivery (“USB-PD”) EPS means an adaptive EPS that utilizes a USB Type-C output port and uses a digital protocol to communicate between the EPS and the end-user product to automatically switch between any output voltage within the range of 3.3 volts to 20 volts. The USB-PD output bus must be capable of delivering 3 amps at the lowest output voltage, and the currents must not exceed any of the following values for the supported voltages: 3 amps at 9 volts; 3 amps at 15 volts, and; 5 amps at 20 volts.

USB Type-C means the reversible 24-pin physical USB connector system that supports USB-PD and allows for the transmission of data and power between compatible USB products.

4. Test Apparatus and General Instructions

(a) Any power measurements recorded, as well as any power measurement equipment utilized for testing, shall conform to the uncertainty and resolution specifications in section 4.4.1, “Power measurement uncertainty,” as well as Annexes B, “Notes on the measurement of low power modes,” and D, “Determination of uncertainty of measurement,” of IEC 62301.

(b) Carry out tests in a room that has an air speed close to the unit under test (UUT) of ≤ 0.5 m/s. Maintain ambient temperature at 20 ± 5 °C throughout the test. Do not intentionally cool the UUT, for example, by use of separately powered fans, air conditioners, or heat sinks. Test the UUT on a thermally non-conductive surface. Products intended for outdoor use may be tested at additional temperatures, provided those are in addition to the conditions specified and are noted in a separate section on the test report.

(c) If the UUT is intended for operation on AC line-voltage input in the United States, test it at 115 V at 60 Hz. If the UUT is intended for operation on AC line-voltage input but cannot be operated at 115 V at 60 Hz, do not test it. Ensure the input voltage is within $\pm 1\%$ of the above specified voltage and the input frequency is within $\pm 1\%$ of the specified frequency.

(d) The input voltage source must be capable of delivering at least 10 times the nameplate input power of the UUT as is specified in IEEE 1515-2000. Regardless of the AC source type, the THD of the supply voltage when supplying the UUT in the specified mode must not exceed 2%, up to and including the 13th harmonic. The peak value of the test voltage must be within 1.34 and 1.49 multiplied by its RMS value.

(e) Select all leads used in the test set-up with appropriate wire gauges and lengths to minimize voltage drops across the wires during testing. See Table B.2—“Commonly used values for wire gages [*sic*] and related voltage drops” in IEEE 1515-2000 for further guidance.

(f) Test Load.

To load the power supply to produce all active-mode loading conditions, use passive loads, such as rheostats, or active loads, such as electronic loads. Resistive loads need not be measured precisely with an ohmmeter; simply adjust a variable resistor to the point where the ammeter confirms that the desired percentage of nameplate output current is

flowing. For electronic loads, adjust the desired output current in constant current mode rather than adjusting the required output power in constant power mode.

(g)(1) Test the external power supply at the end of the wire or cord that connects to an end-use product, regardless of whether the end of the wire or cord is integrated into an end-use product or plugs into and out of an end-use product. If a separate wire or cord is provided by the manufacturer to connect the external power supply to an end-use product, use this wire or cord and perform tests at the end of the cord that connects to an end-use product. If the connection to an end-use product is removable, there are two options for connecting metering equipment to the output connection of the external power supply:

(i) Cut the cord immediately adjacent to the output connector, or

(ii) Attach leads and measure the efficiency from the output connector itself. If the connection to an end-use product is not removable, cut the cord immediately adjacent to the powered product and connect measurement probes at that point. Connect any additional metering equipment such as voltmeters and/or ammeters used in conjunction with resistive or electronic loads directly to the end of the output cable of the UUT.

Conduct the tests on the sets of output wires that constitute the output busses. If the product has more than two output wires, including those wires that are necessary for controlling the product, the manufacturer must supply a connection diagram or test fixture that will allow the testing laboratory to put the UUT into active-mode. Figure 1 of this section provides one illustration of how to set up a single-voltage external power supply for testing; however, the actual test setup may vary pursuant to the type of external power supply being tested and the requirements of this appendix.

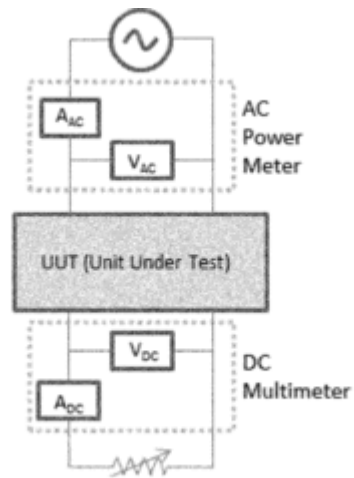


Figure 1. Example Connection Diagram for Single-Voltage External Power Supply Efficiency Measurements

(2) An external power supply that is not supplied with a wire or cord must be tested with a wire or an output cord recommended by the manufacturer.

(h) While external power supplies must be tested in their final, completed configuration in order to represent their measured efficiency on product labels or specification sheets, any functionality that is unrelated to the external power supply circuit may be disconnected during testing as long as the disconnection does not impact the functionality of the external power supply itself. Test the external power supply in its final configuration to the extent possible (within its enclosure and with all output cords that are shipped with it). Exclude from testing devices for which the primary load of the converted voltage within the device is not delivered to a separate end use product, *i.e.*, products in which the primary load of converted voltage is delivered within the device itself to execute the primary function of the device. Examples of excluded products may include consumer electronics with USB outputs, and lighting products with USB outputs.

(i) If a product serves one or more other major functions in addition to converting household electric current into DC current or lower-voltage AC current, components of the product that serve other functions may be disconnected before testing so that test measurements do not include power used by other functions and as long as disconnecting

such components do not affect the ability of the product to convert household electric current into DC current or lower-voltage AC current. For example, consider a surge protector that offers outlets supplying AC household electric current and one or more USB outputs supplying DC current. If power is provided to the AC outlets through a surge protection circuit, but power to the USB outlet(s) is not, then the surge protection circuit may be disconnected from AC power during testing. Similarly, if a lighted manual on-off switch disconnects power only to the AC outlets, but not the USB outputs, then the manual on-off switch may be turned off and power to the light disconnected during testing.

5. Test Measurement for all External Power Supplies other than Adaptive External Power Supplies:

(a) Single-Voltage External Power Supply.

(1) Standby Mode and Active-Mode Measurement.

(i) Place in the “on” position any built-in switch in the UUT controlling power flow to the AC input, and note the existence of such a switch in the final test report.

(ii) Operate the UUT at 100% of nameplate output current for at least 30 minutes immediately prior to conducting efficiency measurements. After this warm-up period, monitor AC input power for a period of 5 minutes to assess the stability of the UUT. If the power level does not drift by more than 5% from the maximum value observed, the UUT is considered stable. If the UUT is stable, record the measurements obtained at the end of this 5-minute period. Measure subsequent loading conditions under the same 5-minute stability parameters. Note that only one warm-up period of 30 minutes is required for each UUT at the beginning of the test procedure. If the AC input power is not stable over a 5-minute period, follow the guidelines established by section 5.3.3 of IEC 62301 for measuring average power or accumulated energy over time for both input and output.

(iii) Test the UUT at the nameplate output voltage(s) at the loading conditions listed in Table 1, derated per the proportional allocation method presented in section 5(a)(1)(iv) of this appendix. Conduct efficiency measurements in sequence from Loading Condition 1 to Loading Condition 4 as indicated in Table 1 of this section. For Loading Condition 5, place the UUT in no-load mode, disconnect any additional signal connections to the UUT, and measure input power.

Table 1—Loading Conditions for Unit Under Test

Loading Condition 1	100% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 2	75% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 3	50% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 4	25% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 5	0%.

The 2% allowance pertains to nameplate output current, not the calculated current value. For example, a UUT at Loading Condition 3 may be tested in a range from 48% to 52% of the derated output current.

(A) If testing of additional, optional loading conditions is desired, conduct that testing in accordance with this test procedure and subsequent to completing the sequence described in section 5(a)(1)(iii) of this appendix.

(B) Where the external power supply lists both an instantaneous and continuous output current, test the external power supply at the continuous condition only.

(C) If an external power supply cannot sustain output at one or more of the Loading Conditions 1–4 as specified in Table 1 of this section, test the external power supply only at the loading conditions for which it can sustain output.

(iv) Use the following proportional allocation method to provide consistent loading conditions for single-voltage external power supplies with multiple output busses. For additional explanation (provided for guidance only), please refer to section 6.1.1 of the

California Energy Commission's "Generalized Test Protocol for Calculating the Energy Efficiency of Internal Ac-Dc Power Supplies Revision 6.7," March 2014.

(A) Consider a power supply with N output busses, each with the same nameplate output voltages V_1, \dots, V_N , corresponding output current ratings I_1, \dots, I_N , and a nameplate output power P. Calculate the derating factor D by dividing the power supply maximum output power P by the sum of the maximum output powers of the individual output busses, equal to the product of port nameplate output voltage and current $V_i I_i$, as follows:

$$D = \frac{P}{\sum_{i=1}^N V_i I_i},$$

(B) If $D \geq 1$, then loading every port to its nameplate output current does not exceed the overall maximum output power for the power supply. In this case, load each output bus to the percentages of its nameplate output current listed in Table 1 of this section.

However, if $D < 1$, it is an indication that loading each port to its nameplate output current will exceed the overall maximum output power for the power supply. In this case, and at each loading condition, load each output bus to the appropriate percentage of its nameplate output current as listed in Table 1, multiplied by the derating factor D.

(v) Test switch-selectable single-voltage external power supplies twice—once at the highest nameplate output voltage and once at the lowest.

(vi) Efficiency calculation. Calculate and record efficiency at each loading point by dividing the UUT's measured active output power at a given loading condition by the active AC input power measured at that loading condition.

(A) Calculate and record average efficiency of the UUT as the arithmetic mean of the efficiency values calculated at Loading Conditions 1, 2, 3, and 4 in Table 1 of this section.

(B) If, when tested, a UUT cannot sustain output current at one or more of the loading conditions as specified in Table 1, the average active-mode efficiency is calculated as the average of the loading conditions for which it can sustain output.

(C) If the UUT can only sustain one output current at any of the output busses, test it at the loading condition that allows for the maximum output power on that bus (i.e. the highest output current possible at the highest output voltage on that bus).

(vii) Power consumption calculation. The power consumption of Loading Condition 5 (no-load) is equal to the active AC input power (W) at that loading condition.

(viii) Off-Mode Measurement. If the UUT incorporates manual on-off switches, place the UUT in off-mode, and measure and record its power consumption at Loading Condition 5 in Table 1 of this section. The measurement of the off-mode energy consumption must conform to the requirements specified in section 5(a)(1) of this appendix, except that all manual on-off switches must be placed in the “off” position for the off-mode measurement. The UUT is considered stable if, over 5 minutes with samples taken at least once every second, the AC input power does not drift from the maximum value observed by more than 1% or 50 milliwatts, whichever is greater. Measure the off-mode power consumption of a switch-selectable single-voltage external power supply twice—once at the highest nameplate output voltage and once at the lowest.

(b) Multiple-Voltage External Power Supply.

(1) Standby-Mode and Active-Mode Measurement.

(i) Place in the “on” position any built-in switch in the UUT controlling power flow to the AC input, and note the existence of such a switch in the final test report.

(ii) Operate the UUT at 100% of nameplate output current for at least 30 minutes immediately prior to conducting efficiency measurements. After this warm-up period, monitor AC input power for a period of 5 minutes to assess the stability of the UUT. If

the power level does not drift by more than 1% from the maximum value observed, the UUT is considered stable. If the UUT is stable, record the measurements obtained at the end of this 5-minute period. Measure subsequent loading conditions under the same 5-minute stability parameters. Note that only one warm-up period of 30 minutes is required for each UUT at the beginning of the test procedure. If the AC input power is not stable over a 5-minute period, follow the guidelines established by section 5.3.3 of IEC 62301 for measuring average power or accumulated energy over time for both input and output.

(iii) Test the UUT at the nameplate output voltage(s) at the loading conditions listed in Table 2 of this section, derated per the proportional allocation method presented in section 5(b)(1)(iv) of this appendix. Active or passive loads used for efficiency testing of the UUT must maintain the required current loading set point for each output voltage within an accuracy of $\pm 0.5\%$. Conduct efficiency measurements in sequence from Loading Condition 1 to Loading Condition 4 as indicated in Table 2 of this section. For Loading Condition 5, place the UUT in no-load mode, disconnect any additional signal connections to the UUT, and measure input power.

Table 2—Loading Conditions for Unit Under Test

Loading Condition 1	100% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 2	75% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 3	50% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 4	25% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 5	0%.

The 2% allowance pertains to nameplate output current, not the calculated current value. For example, a UUT at Loading Condition 3 may be tested in a range from 48% to 52% of the derated output current.

(A) If testing of additional, optional loading conditions is desired, conduct that testing in accordance with this test procedure and subsequent to completing the sequence described in section 5(b)(1)(iii) of this appendix.

(B) Where the external power supply lists both an instantaneous and continuous output current, test the external power supply at the continuous condition only.

(C) If an external power supply cannot sustain output at one or more of the Loading Conditions 1–4 as specified in Table 2 of this section, test the external power supply only at the loading conditions for which it can sustain output.

(iv) Use the following proportional allocation method to provide consistent loading conditions for multiple-voltage external power supplies. For additional explanation (provided for guidance only), please refer to section 6.1.1 of the California Energy Commission's “Proposed Test Protocol for Calculating the Energy Efficiency of Internal Ac-Dc Power Supplies Revision 6.7,” March 2014.

(A) Consider a power supply with N output busses, and nameplate output voltages V_1, \dots, V_N , corresponding output current ratings I_1, \dots, I_N , and a maximum output power P as specified on the manufacturer’s label on the power supply housing, or, if absent from the housing, as specified in the documentation provided with the unit by the manufacturer. Calculate the derating factor D by dividing the power supply maximum output power P by the sum of the maximum output powers of the individual output busses, equal to the product of bus nameplate output voltage and current $V_i I_i$, as follows:

$$D = \frac{P}{\sum_{i=1}^N V_i I_i},$$

(B) If $D \geq 1$, then loading every bus to its nameplate output current does not exceed the overall maximum output power for the power supply. In this case, load each output bus to the percentages of its nameplate output current listed in Table 2 of this section.

However, if $D < 1$, it is an indication that loading each bus to its nameplate output current will exceed the overall maximum output power for the power supply. In this case, and at each loading condition, load each output bus to the appropriate percentage of its

nameplate output current listed in Table 2 of this section, multiplied by the derating factor D.

(v) Minimum output current requirements. Depending on their application, some multiple-voltage power supplies may require a minimum output current for each output bus of the power supply for correct operation. In these cases, ensure that the load current for each output at Loading Condition 4 in Table 2 is greater than the minimum output current requirement. Thus, if the test method's calculated load current for a given voltage bus is smaller than the minimum output current requirement, the minimum output current must be used to load the bus. This load current shall be properly recorded in any test report.

(vi) Efficiency calculation. Calculate and record efficiency at each loading point by dividing the UUT's measured active output power at a given loading condition by the active AC input power measured at that loading condition.

(A) Calculate and record average efficiency of the UUT as the arithmetic mean of the efficiency values calculated at Loading Conditions 1, 2, 3, and 4, in Table 2 of this section.

(B) If, when tested, a UUT cannot sustain output current at one or more of the loading conditions as specified in Table 2 of this section, the average active mode efficiency is calculated as the average of the loading conditions for which it can sustain output.

(C) If the UUT can only sustain one output current at any of the output busses, test it at the loading condition that allows for the maximum output power on that bus (i.e. the highest output current possible at the highest output voltage on that bus).

(vii) Power consumption calculation. The power consumption of Loading Condition 5 (no-load) is equal to the active AC input power (W) at that loading condition.

(2) Off-mode Measurement—If the UUT incorporates manual on-off switches, place the UUT in off-mode and measure and record its power consumption at Loading Condition 5

in Table 2 of this section. The measurement of the off-mode energy consumption must conform to the requirements specified in section (5)(b)(1) of this appendix, except that all manual on-off switches must be placed in the “off” position for the off-mode measurement. The UUT is considered stable if, over 5 minutes with samples taken at least once every second, the AC input power does not drift from the maximum value observed by more than 1% or 50 milliwatts, whichever is greater.

6. Test Measurement for Adaptive External Power Supplies:

(a) Single-Voltage Adaptive External Power Supply.

(1) Standby Mode and Active-Mode Measurement.

(i) Place in the “on” position any built-in switch in the UUT controlling power flow to the AC input, and note the existence of such a switch in the final test report.

(ii) Operate the UUT at 100% of nameplate output current for at least 30 minutes immediately prior to conducting efficiency measurements. After this warm-up period, monitor AC input power for a period of 5 minutes to assess the stability of the UUT. If the power level does not drift by more than 5% from the maximum value observed, the UUT is considered stable. If the UUT is stable, record the measurements obtained at the end of this 5-minute period. Measure subsequent loading conditions under the same 5-minute stability parameters. Note that only one warm-up period of 30 minutes is required for each UUT at the beginning of the test procedure. If the AC input power is not stable over a 5-minute period, follow the guidelines established by section 5.3.3 of IEC 62301 for measuring average power or accumulated energy over time for both input and output.

(iii) Test the UUT at the nameplate output voltage(s) at the loading conditions listed in Table 3 of this section, derated per the proportional allocation method presented in section 6(a)(1)(iv) of this appendix. Adaptive external power supplies must be tested

twice – once at the highest nameplate output voltage and once at the lowest nameplate output voltage as described in the following sections.

(A) At the highest nameplate output voltage, test adaptive external power supplies in sequence from Loading Condition 1 to Loading Condition 4, as indicated in Table 3 of this section. For Loading Condition 5, place the UUT in no-load mode, disconnect any additional signal connections, and measure the input power.

(B) At the lowest nameplate output voltage, with the exception of USB-PD EPSs, test all adaptive external power supplies in sequence from Loading Condition 1 to Loading Condition 4, as indicated in Table 3 of this section. For USB-PD adaptive external power supplies, at the lowest nameplate output voltage, test the external power supply such that for Loading Conditions 1, 2, 3, and 4, all adaptive ports are loaded to 2 amperes, 1.5 amperes, 1 ampere and 0.5 amperes respectively. All non-adaptive ports will continue to be loaded as indicated in Table 3 of this section. For Loading Condition 5, test all adaptive external power supplies by placing the UUT in no-load mode, disconnecting any additional signal connections, and measuring the input power.

Table 3—Loading Conditions for a Single-Voltage Adaptive External Power Supply

Loading Condition 1	100% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 2	75% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 3	50% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 4	25% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 5	0%.

The 2% allowance pertains to nameplate output current, not the calculated current value. For example, a UUT at Loading Condition 3 may be tested in a range from 48% to 52% of the derated output current.

(C) If testing of additional, optional loading conditions is desired, conduct that testing in accordance with this test procedure and subsequent to completing the sequence described in section 6(a)(1)(iii) of this appendix.

(D) Where the external power supply lists both an instantaneous and continuous output current, test the external power supply at the continuous condition only.

(E) If an external power supply cannot sustain output at one or more of the Loading Conditions 1–4 as specified in Table 3 of this section, test the external power supply only at the loading conditions for which it can sustain output.

(iv) Use the following proportional allocation method to provide consistent loading conditions for single-voltage adaptive external power supplies with multiple output busses. For additional explanation, please refer to section 6.1.1 of the California Energy Commission's “Proposed Test Protocol for Calculating the Energy Efficiency of Internal Ac-Dc Power Supplies Revision 6.7,” March 2014.

(A) Consider a power supply with N output busses, each with the same nameplate output voltages V_1, \dots, V_N , corresponding output current ratings I_1, \dots, I_N , and a maximum output power P as specified on the manufacturer’s label on the power supply housing, or, if absent from the housing, as specified in the documentation provided with the unit by the manufacturer. Calculate the derating factor D by dividing the power supply maximum output power P by the sum of the maximum output powers of the individual output busses, equal to the product of port nameplate output voltage and current $I_i V_i$, as follows:

$$D = \frac{P}{\sum_{i=1}^N V_i I_i},$$

For USB-PD adaptive external power supplies, at the lowest nameplate output voltage, limit the contribution from each port to 10W when calculating the derating factor.

(B) If $D \geq 1$, then loading every port to its nameplate output current does not exceed the overall maximum output power for the power supply. In this case, load each output bus to the percentages of its nameplate output current listed in Table 3 of this section.

However, if $D < 1$, it is an indication that loading each port to its nameplate output current

will exceed the overall maximum output power for the power supply. In this case, and at each loading condition, each output bus will be loaded to the appropriate percentage of its nameplate output current listed in Table 3 of this section, multiplied by the derating factor D.

(v) Efficiency calculation. Calculate and record the efficiency at each loading point by dividing the UUT's measured active output power at that loading condition by the active AC input power measured at that loading condition.

(A) Calculate and record average efficiency of the UUT as the arithmetic mean of the efficiency values calculated at Loading Conditions 1, 2, 3, and 4 in Table 3 of this section.

(B) If, when tested, a UUT cannot sustain the output current at one or more of the loading conditions as specified in Table 3 of this section, the average active-mode efficiency is calculated as the average of the loading conditions for which it can sustain output.

(C) If the UUT can only sustain one output current at any of the output busses, test it at the loading condition that allows for the maximum output power on that bus (*i.e.* the highest output current possible at the highest output voltage on that bus).

(vi) Power consumption calculation. The power consumption of Loading Condition 5 (no-load) is equal to the active AC input power (W) at that loading condition.

(2) Off-Mode Measurement—If the UUT incorporates manual on-off switches, place the UUT in off-mode, and measure and record its power consumption at loading condition 5 in Table 3 of this section. The measurement of the off-mode energy consumption must conform to the requirements specified in section 6(a)(1) of this appendix, except that all manual on-off switches must be placed in the “off” position for the off-mode measurement. The UUT is considered stable if, over 5 minutes with samples taken at least once every second, the AC input power does not drift from the maximum value observed by more than 1% or 50 milliwatts, whichever is greater. Measure the off-mode

power consumption of a single-voltage adaptive external power supply twice - once at the highest nameplate output voltage and once at the lowest.

(b) Multiple-Voltage Adaptive External Power Supply.

(1) Standby Mode and Active-Mode Measurement.

(i) Place in the “on” position any built-in switch in the UUT controlling power flow to the AC input, and note the existence of such a switch in the final test report.

(ii) Operate the UUT at 100% of nameplate output current for at least 30 minutes immediately prior to conducting efficiency measurements. After this warm-up period, monitor AC input power for a period of 5 minutes to assess the stability of the UUT. If the power level does not drift by more than 1% from the maximum value observed, the UUT is considered stable. If the UUT is stable, record the measurements obtained at the end of this 5-minute period. Measure subsequent loading conditions under the same 5-minute stability parameters. Note that only one warm-up period of 30 minutes is required for each UUT at the beginning of the test procedure. If the AC input power is not stable over a 5-minute period, follow the guidelines established by section 5.3.3 of IEC 62301 for measuring average power or accumulated energy over time for both input and output.

(iii) Test the UUT at the nameplate output voltage(s) at the loading conditions listed in Table 4 of this section, derated per the proportional allocation method presented in paragraph 6(b)(1)(iv) of this appendix. Active or passive loads used for efficiency testing of the UUT must maintain the required current loading set point for each output voltage within an accuracy of $\pm 0.5\%$. Adaptive external power supplies must be tested twice – once at the highest nameplate output voltage and once at the lowest nameplate output voltage as described in the following sections.

(A) At the highest nameplate output voltage, test adaptive external power supplies in sequence from Loading Condition 1 to Loading Condition 4, as indicated in Table 4 of

this section. For Loading Condition 5, place the UUT in no-load mode, disconnect any additional signal connections, and measure the input power.

(B) At the lowest nameplate output voltage, with the exception of USB-PD EPSs, test all other adaptive external power supplies, in sequence from Loading Condition 1 to Loading Condition 4, as indicated in Table 4 of this section. For USB-PD adaptive external power supplies, at the lowest nameplate output voltage, test the external power supply such that for Loading Conditions 1, 2, 3, and 4, all adaptive ports are loaded to 2 amperes, 1.5 amperes, 1 ampere and 0.5 amperes respectively. All non-adaptive ports will continue to be loaded as indicated in Table 4 of this section. For Loading Condition 5, test all adaptive external power supplies by placing the UUT in no-load mode, disconnecting any additional signal connections, and measuring the input power.

Table 4—Loading Conditions for a Multiple-Voltage Adaptive External Power Supply

Loading Condition 1	100% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 2	75% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 3	50% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 4	25% of Derated Nameplate Output Current $\pm 2\%$.
Loading Condition 5	0%.

The 2% allowance pertains to nameplate output current, not the calculated current value. For example, a UUT at Loading Condition 3 may be tested in a range from 48% to 52% of the derated output current.

(C) If testing of additional, optional loading conditions is desired, conduct that testing in accordance with this test procedure and subsequent to completing the sequence described in section 6(b)(1)(iii) of this appendix.

(D) Where the external power supply lists both an instantaneous and continuous output current, test the external power supply at the continuous condition only.

(E) If an adaptive external power supply is operating as a multiple-voltage external power supply at only the highest nameplate output voltage or lowest nameplate output voltage,

test this external power supply as a multiple-voltage adaptive external power supply at both the highest nameplate output voltage and the lowest nameplate output voltage.

(F) If an external power supply has both adaptive and non-adaptive ports, and these ports operate simultaneously at multiple voltages, ensure that testing is performed with all ports active at both the highest and lowest nameplate output voltage. For example, if an external power supply has an USB-PD adaptive output bus that operates at 5 volts and 20 volts and a second non-adaptive output bus that operates at 9 volts, test this EPS at the highest nameplate output voltage with both the adaptive and non-adaptive ports respectively loaded at 20 volts and 9 volts; likewise, test it at the lowest nameplate output voltage with both the adaptive and non-adaptive ports respectively loaded at 5 volts and 9 volts.

(G) If an external power supply cannot sustain output at one or more of the Loading Conditions 1–4 as specified in Table 4 of this section, test the external power supply only at the loading conditions for which it can sustain output.

(iv) Use the following proportional allocation method to provide consistent loading conditions for multiple-voltage adaptive external power supplies. For additional explanation, please refer to section 6.1.1 of the California Energy Commission's "Proposed Test Protocol for Calculating the Energy Efficiency of Internal Ac-Dc Power Supplies Revision 6.7," March 2014.

(A) Consider a multiple-voltage power supply with N output busses, and nameplate output voltages V_1, \dots, V_N , corresponding output current ratings I_1, \dots, I_N , and a maximum output power P as specified on the manufacturer's label on the power supply housing, or, if absent from the housing, as specified in the documentation provided with the unit by the manufacturer. Calculate the derating factor D by dividing the power supply maximum output power P by the sum of the maximum output powers of the

individual output busses, equal to the product of bus nameplate output voltage and current $I_i V_i$, as follows:

$$D = \frac{P}{\sum_{i=1}^N V_i I_i},$$

For USB-PD adaptive external power supplies, at the lowest nameplate output voltage, limit the contribution from each port to 10W when calculating the derating factor.

(B) If $D \geq 1$, then loading every bus to its nameplate output current does not exceed the overall maximum output power for the power supply. In this case, load each output bus to the percentages of its nameplate output current listed in Table 4 of this section.

However, if $D < 1$, it is an indication that loading each bus to its nameplate output current will exceed the overall maximum output power for the power supply. In this case, at each loading condition, load each output bus to the appropriate percentage of its nameplate output current listed in Table 4 of this section, multiplied by the derating factor D .

(v) Minimum output current requirements. Depending on their application, some multiple-voltage adaptive external power supplies may require a minimum output current for each output bus of the power supply for correct operation. In these cases, ensure that the load current for each output at Loading Condition 4 in Table 4 of this section is greater than the minimum output current requirement. Thus, if the test method's calculated load current for a given voltage bus is smaller than the minimum output current requirement, use the minimum output current to load the bus. Record this load current in any test report.

(vi) Efficiency calculation. Calculate and record the efficiency at each loading point by dividing the UUT's measured active output power at that loading condition by the active AC input power measured at that loading condition.

(A) Calculate and record average efficiency of the UUT as the arithmetic mean of the efficiency values calculated at Loading Conditions 1, 2, 3, and 4 in Table 4 of this section.

(B) If, when tested, a UUT cannot sustain the output current at one or more of the loading conditions as specified in Table 4, the average active-mode efficiency is calculated as the average of the loading conditions for which it can sustain output.

(C) If the UUT can only sustain one output current at any of the output busses, test it at the loading condition that allows for the maximum output power on that bus (i.e. the highest output current possible at the highest output voltage on that bus).

(vii) Power consumption calculation. The power consumption of Loading Condition 5 (no-load) is equal to the active AC input power at that loading condition.

(2) Off-mode Measurement—If the UUT incorporates manual on-off switches, place the UUT in off-mode, and measure and record its power consumption at Loading Condition 5 in Table 4 of this section. The measurement of the off-mode energy consumption must conform to the requirements specified in section (6)(b)(1) of this appendix, except that all manual on-off switches must be placed in the “off” position for the off-mode measurement. The UUT is considered stable if, over 5 minutes with samples taken at least once every second, the AC input power does not drift from the maximum value observed by more than 1% or 50 milliwatts, whichever is greater. Measure the off-mode power consumption of a multiple-voltage adaptive external power supply twice - once at the highest nameplate output voltage and once at the lowest.

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